Amendments to the Specification

Page 1, amend the paragraph inserted by Preliminary Amendment after the title of the invention as follows:

This application is a Divisional application of application Serial No. 09/994,834, filed November 28, 2001, now USP 6,706,422.

Page 4, please replace the paragraphs spanning lines 13-26 with the following rewritten paragraphs:

In order to achieve the above object, the present invention provides an electroless Ni-B plating liquid for forming a Ni-B alloy film on at least part of interconnects of an electronic device having an embedded interconnect structure, the electroless Ni-B plating liquid comprising nickel ions, a complexing agent for the nickel ions, a reducing agent for the nickel ions, and ~~ammoniums~~ ammonium ions (NH_4^+).

The inclusion of ~~ammonums~~ ammonium ions (NH_4^+) in the plating liquid can lower the boron content of the plated film to provide a Ni-B alloy film having an FCC crystalline structure, and can also lower the plating rate by ~~ammoniums~~ ammonium ions (NH_4^+) so as to thereby facilitate the process control. It is considered, in this regard, that an ammonia ion, due to its generally high chelating force, may form a complex with a nickel ion to thereby lower the plating rate.

Page 5, please replace the paragraph at line 4 with the following rewritten paragraph:

The ~~ammonums~~ ammonium ions may be prepared from e.g. ammonia water.

Page 6, please replace the paragraph spanning lines 3-10 with the following rewritten paragraph:

The present invention further provides a method for manufacturing an electronic device, comprising; electroless plating an electronic device having an embedded interconnect structure with an electroless Ni-B plating liquid to form a protective layer of a Ni-B alloy film selectively on a surface of an interconnect of the electronic device;

wherein the electroless Ni-B plating liquid comprises nickel ions, a complex agent for nickel ions, a reducing agent for nickel ions, and ~~ammonums~~ ammonium ions (NH_4^+).

Page 11, please replace the paragraph spanning lines 21-27 with the following rewritten paragraph:

The protective film 9 is formed selectively on the exposed surface of the interconnects 8 by using an electroless Ni-B plating liquid containing nickel ions, a complexing agent for nickel ions, an alkylamine borane or a hydrogen boride compound as a reducing agent for nickel ions, and ~~ammonums~~ ammonium ions (NH_4^+), a pH of the plating liquid being adjusted to e.g. 8-12, and dipping the surface of the substrate 1 in the plating liquid.

Page 24, please replace the paragraph spanning lines 17-23 with the following rewritten paragraph:

The above described experimental results clearly show that the Ni-B alloy film having a boron content of 3.2 at%, obtained by using the electroless Ni-B plating liquid which contains ~~ammonums~~ ammonium ions, has a crystalline phase that is thermally stable, and can be suitably utilized as a protective film for multilayer silver interconnects having, for example, a laminated structure of Ti/TiN/Cu/Ag/Ni-B.

Page 24, please replace the paragraph spanning line 27 through page 25, line 8 with the following rewritten paragraph:

As described hereinabove, the electroless Ni-B plating liquid of the present invention, which contains ~~ammonums~~ ammonium ions, can lower the boron content of the plated film without increasing the plating rate and form a Ni-B alloy film having an FCC crystalline structure. By using the present plating liquid, which can facilitate the process control, a protective film of Ni-B alloy film can be formed selectively on the interconnects of an electronic device having an embedded interconnect structure. The present invention can thus contribute to speedup and densification in electronic devices.

Page 29, please replace the paragraph spanning lines 1-8 with the following rewritten paragraph:

Part of the air is discharged from the processing area 530 through the duct ~~53~~ 553 connected to a floor 530b of the processing area 530. Air containing a chemical mist and gases is also discharged from the processing area 530, through the duct 553. An amount of fresh air which is commensurate with the amount of air discharged through the duct 553 is supplied from the duct 539 into the plating chamber 530 under the negative pressure developed therein with respect to the pressure in the clean room.

Page 30, please replace the paragraph spanning lines 2-18 with the following rewritten paragraph:

As described above, as shown in FIG. 14, the cleaning and drying area 540 is disposed between the loading and unloading area 520, and the processing area 530. The partition 521 is disposed between the loading and unloading area 520, and the cleaning and drying area 540. The partition 523 is disposed between the cleaning and drying area 540, and the processing area 530. A dry semiconductor wafer is loaded from the working zone 558 through the cassette transfer port 555 into the substrate plating apparatus, and then plated in the substrate plating apparatus. The plated semiconductor wafer is cleaned and dried, and then unloaded from the substrate plating apparatus through the cassette transfer port 555 into the working zone 558. Consequently, no particles and mist are applied to the surface of the semiconductor wafer, and the working zone 558 which has higher air cleanness than the utility zone 557 is prevented from being contaminated by particles, chemical mists, and cleaning solution mists.

Page 34, please replace the paragraph spanning line 27 through page 35, line 3 with the following rewritten paragraph:

After the protective plated layer is polished, the semiconductor wafer W is cleaned by water in one of the water cleaning chambers 606, 607, dried in the drying chamber 608, and then transferred to the wafer cassette ~~609-1~~ 601-1 in the unloading unit 609.

Page 37, please replace the paragraph spanning line 20 through page 38, line 5 with the following rewritten paragraph:

A cassette 701-1 accommodating the semiconductor substrates W, in which a via hole and a trench for interconnect are formed, and a seed layer is formed thereon is placed on a loading port of the loading and unloading section 701. The first robot 703 takes out the semiconductor substrate W from the cassette 701-1, and carries the semiconductor substrate W into the plated Cu film forming unit 702 where a plated Cu film ~~106~~ is formed. At this time, the film thickness of the seed layer is measured with the before-plating and after-plating film thickness measuring instrument 712. The plated Cu film is formed by carrying out hydrophilic treatment of the face of the semiconductor substrate W, and then Cu plating. After formation of the plated Cu film, rinsing or cleaning of the semiconductor substrate W is carried out in the plated Cu film forming unit 702.

Page 42, please replace the paragraph spanning lines 5-10 with the following rewritten paragraph:

As described above, if the film thickness has been measured with the film thickness measuring instrument 711-4 provided near the polishing table 711-1, then the semiconductor substrate W is not subjected to further process and is accommodated into the cassette placed on the unloading port of the loading and unloading section ~~771~~ 701.

Page 44, please replace the paragraph spanning lines 2-15 with the following rewritten paragraph:

FIG. 23 is a view showing a plan layout constitution of another example of the substrate processing apparatus. In FIG. 23, portions denoted by the same reference numerals as those in FIG. 20 show the same or corresponding portions. In the substrate processing apparatus, a pusher indexer 725 is disposed close to a first polishing apparatus 710 and a second polishing apparatus 711. Substrate placing tables 721, 722 are disposed close to a third cleaning machine 704 and a plated Cu film forming unit 702, respectively. A robot ~~23~~ 723 is disposed close to a first cleaning machine 709 and the third cleaning machine 704. Further, a robot 724 is disposed close to a second cleaning machine 707

and the plated Cu film forming unit 702, and a dry state film thickness measuring instrument 713 is disposed close to a loading and unloading section 701 and a first robot 703.

Page 50, please replace the paragraph spanning lines 3-14 with the following rewritten paragraph:

FIG. 26 is a flow chart showing the flow of the respective steps in the present substrate processing apparatus. The respective steps in the apparatus will be described according to this flow chart. First, a semiconductor substrate taken out by the first robot 831 from a cassette 820a placed on the load and unload unit ~~820~~ is placed in the first aligner and film thickness measuring unit 841, in such a state that its surface, to be plated, faces upward. In order to set a reference point for a position at which film thickness measurement is made, notch alignment for film thickness measurement is performed, and then film thickness data on the semiconductor substrate before formation of a Cu film are obtained.

Page 53, please replace the paragraph spanning line 18 through page 54, line 2 with the following rewritten paragraph:

The semiconductor substrate is transported by the second robot 832 from the substrate temporary placing table 845 to the cap plating unit 817 where cap plating is applied onto the Cu surface with the aim of preventing oxidation of Cu due to the atmosphere. The semiconductor substrate to which cap plating has been applied is carried by the second robot 832 from the cover plating unit 817 to the third film thickness measuring instrument ~~146~~ 846 where the thickness of the copper film is measured. Thereafter, the semiconductor substrate is carried by the first robot 831 into the second cleaning unit 818 where it is cleaned with pure water or deionized water. The semiconductor substrate after completion of cleaning is returned into the cassette 820a placed on the ~~loading~~ load and ~~unloading section 820~~ unload unit.

Page 54, please replace the paragraph spanning line 27 through page 55, line 8 with the following rewritten paragraph:

The width of movement L of the edge nozzle 926 is set such that the edge nozzle ~~226~~ 926 can be arbitrarily positioned in a direction toward the center from the outer peripheral end surface of the substrate, and a set value for L is inputted according to the size, usage, or the like of the substrate W. Normally, an edge cut width C is set in the range of 2 mm to 5 mm. In the case where a rotational speed of the substrate is a certain value or higher at which the amount of liquid migration from the backside to the face is not problematic, the copper film within the edge cut width C can be removed.